

conversion circuit comprises a comparator connected to one of said phase windings and a flip flop circuit connected to said comparator.

*a 3  
Chnl'd.*  
10. (Amended) The voltage regulator as claimed in claim 9, wherein said pulse conversion circuit forms said pulse signal having a plurality of times as many frequency as a frequency of an output voltage.

11. (Amended) The voltage regulator as claimed in claim 9, wherein said power-drive circuit forms said pulse signal having two times as many frequencies as a frequency of an output voltage from a pair of said phase-windings whose phases are 90° different from each other.

*a 4*  
13. (Amended) The voltage regulator as claimed in claim 9, wherein said power drive circuit has a switch for opening or closing a circuit connecting said battery and a power line.

#### REMARKS

Claims 1-13 are pending. By this Amendment, the title and claims 1, 3-5, 8-11 and 13 are amended. The amendments to claim 1, 8 and 9 only make explicit that which was implicit in the claims and does not narrow the scope of the pending claims from those previously filed. The amendments to claims 4, 5, 11 and 13 either correct a minor grammatical error or provide proper antecedent basis for a recited feature. Thus, no new matter is added.

The attached Appendix includes a marked-up copy of the title, as well as each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Applicants request communications from the Patent Office be forwarded to Oliff & Berridge, PLC, in accordance with the Submission Of Power Of Attorney By Assignee mailed on January 30, 2002.

Applicants request clarification of the status of the drawings. Applicants filed formal drawings on June 26, 2001, and the Office Action Summary states those drawings are accepted. Yet, in item 1 of the Detailed Action, it is noted that formal drawings will be required when the application is allowed. Thus, Applicants see no reason for item 1 and request it be withdrawn in light of the acceptance of the drawings in the Summary.

The Office Action rejects claims 1-8 under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 5,493,202 to Iwatani et al. (Iwatani). The rejection is respectfully traversed.

Applicants assert that Iwatani does not disclose a voltage regulator for a vehicle AC generator including a field circuit having a field coil in a plurality of magnetic poles and an output circuit having an armature coil, the voltage regulator comprising... a bypass circuit having a variable resistance, connected between the armature coil and a ground, for bypassing leak current flowing in the armature coil to the ground. Additionally, Iwatani does not disclose means for decreasing the variable resistance of the bypass circuit when the second means does not supply field current and increasing the variable resistance of the bypass circuit when the second means supplies field current to the field coil.

In contrast, Iwatani is silent as to a bypass circuit having a variable resistance. Therefore, in contrast to the instant application, if leak current were to flow into the armature coil while detecting a self excited voltage, the potential of the terminal P could not be prevented from being affected so that the self excited voltage could be detected accurately. Thus, Iwatani does not recite all of the features of claims 1-8. Accordingly, Applicants respectfully request the rejection of claims 1-8 under 35 U.S.C. §102(b) be withdrawn.

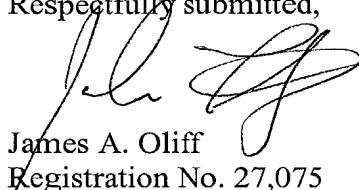
The Office Action rejects claims 9-13 under 35 U.S.C. §103(a) as unpatentable over Iwatani in view of U.S. Patent No. 5,550,457 to Kusase et al. (Kusase). The rejection is respectfully traversed.

The Office Action admits that Iwatani does not disclose a power drive circuit as recited in claim 9 or the additional features recited in claims 10-13. Applicants assert that even if Kusase provides for the admitted deficiencies, Kusase fails to disclose or suggest the additional features recited in claim 9, i.e., that the voltage regulator comprises means, connected to a portion of the phase windings, for detecting a self excited voltage that is induced in the phase windings by a residual magnetic field. Further, Kusase fails to disclose or suggest a power drive circuit including a pulse conversion circuit for converting the self excited voltage into a binary pulse signal, the drive circuit driving the power circuit for a predetermined period starting from an edge of the binary pulse signal, wherein the pulse conversion circuit comprises a comparator connected to one of the phase windings and a flip-flop circuit connected to the comparator. Accordingly, Applicants submit that neither Iwatani or Kusase, whether considered alone or in combination, disclose or suggest all of the features recited in claims 9-13. Thus, Applicants respectfully request the rejection of claims 9-13 under 35 U.S.C. §103(a) be withdrawn.

In view of the foregoing, reconsideration of the application is requested. It is submitted that the claims as presented herein patentably distinguish over the applied references and fully meet the requirements of 35 U.S.C. §112. Accordingly, allowance of claims 1-13 is respectfully solicited.

Should the Examiner believe anything further is desirable in order to place the application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,



James A. Oliff  
Registration No. 27,075

John W. Fitzpatrick  
Registration No. 41,018

JAO:JWF/mmc

Attachment:  
Appendix

Date: October 31, 2002

**OLIFF & BERRIDGE, PLC**  
**P.O. Box 19928**  
**Alexandria, Virginia 22320**  
**Telephone: (703) 836-6400**

<p><b>DEPOSIT ACCOUNT USE AUTHORIZATION</b> Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461</p>
---

## APPENDIX

## Changes to Title:

The following is a marked-up version of the amended title:

VOLTAGE REGULATOR OF VEHICLE AC GENERATOR HAVING VARIABLE  
BYPASS CIRCUIT RESISTANCE

## Changes to Claims:

The following is a marked-up version of the amended claim(s):

1. (Amended) A voltage regulator of a vehicle AC generator including a field circuit having a field coil and a plurality of magnetic poles and an output circuit having an armature coil, said voltage regulator comprising:

first means, connected to said armature coil, for detecting a self-excited voltage that is induced in said armature coil by a residual magnetic flux of said rotor;

second means for supplying field current to said field coil when said self-excited voltage is detected; and

a bypass circuit having a variable resistance, connected between said armature coil and a ground, for bypassing leak current flowing in said armature to the ground; and

third means, including a bypass circuit connected to a ground, for decreasing said variable resistance of said bypass circuit when said second means does not supply field current and increasing said variable resistance of said bypass circuit when said second means supplies field current to said field coil.

3. (Amended) The voltage regulator as claimed in claim 1, wherein said third means comprises a circuit for decreasing said resistance of said a bypass resistor after increasing said resistance for a predetermined duration.

4. (Amended) The voltage regulator as claimed in claim 1, wherein

said first means comprises a power drive circuit including a pulse conversion circuit for converting said self-excited voltage into a binary pulse signal;

said second means comprises a control circuit for controlling said field current, and a power circuit connected to said control circuit; and, wherein said power-drive circuit supplies electric power to said power circuit according to said binary pulse signal.

5. (Amended) The voltage regulator as claimed in claim 4, wherein said armature coil of said AC generator includes a plurality of phase-windings; and said pulse conversion circuit comprises a number of comparators respectively connected to the same number of said phase-windings to convert said self-excited voltage into a binary pulse signal having the same number of times as many frequencies as said self-excited voltage.

8. (Amended) A voltage regulator of a vehicle AC generator including a field circuit having a field coil and a plurality of magnetic poles and an output circuit having an armature coil, said voltage regulator comprising:

a control circuit for supplying field current to said field coil;  
a power circuit for supplying electric power to said control circuit to operate the same;

first means for detecting a self-excited voltage generated in said armature coil;  
a power drive circuit for controlling said power circuit according to the a-self-  
excited voltage induced in said armature coil, said power drive circuit including a pulse  
conversion circuit for converting said self-excited voltage into a binary pulse signal; and  
a bypass circuit having a variable resistance, connected between said armature  
coil and a ground, for bypassing leak current flowing in said armature coil to the ground; and  
second means, including a bypass circuit connected to a ground, for  
decreasing said variable resistance of said bypass circuit when said power circuit does not

supply electric power to said control circuit and increasing said variable resistance of said bypass circuit when said power circuit supplies electric power to said control circuit.

9. (Amended) A voltage regulator of a vehicle AC generator for charging a battery, said AC generator including a field circuit having a field coil and a plurality of magnetic poles, an output circuit having a plurality of phase-windings and a rectifier unit for providing DC output power, said voltage regulator comprising:

means, connected to a portion of said phase windings, for detecting a self-excited voltage that is induced in said phase windings by a residual magnetic field;

a switching circuit for controlling field current to be supplied to said field coil;

a switch control circuit for controlling said switching circuit;

a power circuit connected to said switch control circuit; and

a power-drive circuit including a pulse conversion circuit for converting said self-excited voltage into a binary pulse signal, said drive circuit driving said power circuit for a predetermined period starting from an edge of said binary pulse signal, wherein said pulse conversion circuit comprises a comparator connected to one of said phase windings and a flip-flop circuit connected to said comparator.

10. (Amended) The voltage regulator as claimed in claim 9, wherein said pulse conversion circuit forms said pulse signal having a plurality of times as many frequency as a frequency of said an output voltage.

11. (Amended) The voltage regulator as claimed in claim 9, wherein said power-drive circuit forms said pulse signal having two times as many frequencies as a frequency of said an output voltage from a pair of said phase-windings whose phases are 90° different from each other.

13. (Amended) The voltage regulator as claimed in claim 9, wherein said power-circuit drive circuit has a switch for opening or closing a circuit connecting said battery and said power line.